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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/811,931

03/30/2004

Takashi Fuse

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03/10/2006

OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C.
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EXAMINER

VINH, LAN

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/811,931

Applicant(s)

FUSE, TAKASHI

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Flanner et al (US 6,653,734)

Flanner disclose a two step etching process. The process comprises the steps of:
supplying processing gas into airtight processing chamber, plasmizing the processing gas, and plasma- processing low-k material/target layer formed on an object be processed by using resist film as a mask (col 10, lines 44-65), wherein plasma- processing conducted while a gas combination/a process condition being changed on the basis of a variation of photoresist coverage/a thickness reduction rate of the resist film (col 11, lines 5-22)

Regarding claim 2, Flanner discloses performing a first etching step/first process of plasma-processing target layer while the thickness of the resist film being monitored the thickness reduction rate resist film reaches predetermined value (col 10, lines 60-65), Flanner also discloses that the photoresist survives for a period of time during the low k etch step/etch step while the gas combination being changed (col 4, lines 15-17, col 11,

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lines 14-20), which reads on the selectivity against the resist film is higher in the etching step

Regarding claim 3, Flanner discloses etching the low k dielectric /first process using fluorocarbon (col 9, lines 20-25) and etching the low-k continues/second etching using hydrocarbon, the hydrocarbon further includes hydrofluorocarbons /CHF (col 5, lines 42-45; col 11, lines 15-20)

Regarding claim 4, Flanner discloses performing the low-k etch/second etch using the same etchant, used in the first etching step, the etchant may include one or more diluent/component (col 11, lines 17-20)

Regarding claim 5, Flanner discloses etching the low k dielectric/ second etching using an etch chemistry includes CO₂ gas (col 3, lines 60-64)

Regarding claim 6, Flanner discloses exposing the photoresist to light/ray and detecting photoresist endpoint (col 2, lines 15-20; col 11, lines 10-12)

Allowable Subject Matter

3. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

4. Applicant's arguments filed 1/17/2006 have been fully considered but they are not persuasive.

The applicants argue that in the claimed invention, the plasma-processing can be conducted according to a time-dependent variable. The etching process disclosed in Flanner is different from the method of the claimed invention because, in Flanner, the etching process is conducted according to the thickness of the photoresist itself without considering a time-dependent thickness reduction rate of the photoresist. This argument is unpersuasive because it does not commensurate with the scope of claim 1 because claim 1 does not recite/require "a time-dependent thickness reduction rate of the photoresist". Since Flanner discloses that the gas combination/a process condition being changed on the basis of a variation of photoresist coverage/a thickness reduction rate of the resist film (col 11, lines 5-22), Flanner teaching reads on conducting the plasma processing while a process condition is being changed on the basis of a variation of a thickness reduction rate of the resist film as required in claim 1

The applicants also argue that Flanner is completely silent on a selectivity difference in first and second processes. This argument is unpersuasive because as recited in col 9, lines 60-65 of Flanner, Flanner discloses that the low-k plasma etch rate was much lower at the edges of the wafer in the second process which reads on a selectivity difference in first and second processes. Thus, the examiner asserts that that Flanner is not completely silent on a selectivity difference in first and second processes.

It is argue that Flanner does not describe that different processing gases are used in first and second process. This argument is unpersuasive because Flanner discloses etching the low k dielectric /first process using fluorocarbon (col 9, lines 20-25) and

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etching the low-k continues/second etching using hydrocarbon, the hydrocarbon further includes hydrofluorocarbons /CHF (col 5, lines 42-45; col 11, lines 15-20)

The applicants further argue that Flanner does not disclose the features of one or more reduced components, e.g., CO, are supplied in the processing gas of the second process to thereby prevent or ameliorate the thickness reduction of the resist film during the second process, as required in claim 4. This argument is unpersuasive because it does not commensurate with the scope of claim 4 because claim 4 does not recite/require "one or more reduced components, e.g., CO, are supplied in the processing gas of the second process to thereby prevent or ameliorate the thickness reduction of the resist film"

5. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV
March 3, 2006